

**Translation**

**PATENT COOPERATION TREATY**

**PCT**

**INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY**  
(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference <b>WA-0933</b>	<b>FOR FURTHER ACTION</b>	See Form PCT/IPEA/416
International application No. <b>PCT/JP2004/011591</b>	International filing date ( <i>day/month/year</i> ) <b>12.08.2004</b>	Priority date ( <i>day/month/year</i> ) <b>12.08.2003</b>
International Patent Classification (IPC) or national classification and IPC <b>B01J35/04, 27/224, 37/02, 37/08, B01D/39, 46/00, 53/86, C04B35/565, F01N3/28</b>		
Applicant <b>NGK INSULATORS, LTD.</b>		

1.	This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.
2.	This REPORT consists of a total of <u>8</u> sheets, including this cover sheet.
3.	This report is also accompanied by ANNEXES, comprising: a. <input checked="" type="checkbox"/> ( <i>sent to the applicant and to the International Bureau</i> ) a total of <u>3</u> sheets, as follows: <input checked="" type="checkbox"/> sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions). <input type="checkbox"/> sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box. b. <input type="checkbox"/> ( <i>sent to the International Bureau only</i> ) a total of (indicate type and number of electronic carrier(s)) _____, containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).
4.	This report contains indications relating to the following items: <input checked="" type="checkbox"/> Box No. I Basis of the report <input type="checkbox"/> Box No. II Priority <input type="checkbox"/> Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability <input type="checkbox"/> Box No. IV Lack of unity of invention <input checked="" type="checkbox"/> Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement <input type="checkbox"/> Box No. VI Certain documents cited <input checked="" type="checkbox"/> Box No. VII Certain defects in the international application <input checked="" type="checkbox"/> Box No. VIII Certain observations on the international application

Date of submission of the demand	Date of completion of this report
Name and mailing address of the IPEA/JP	Authorized officer
Facsimile No.	Telephone No.

## INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.

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Box No. I Basis of the report

1. With regard to the language, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.
- ☐ This report is based on translations from the original language into the following language \_\_\_\_\_ which is the language of a translation furnished for the purposes of:
- ☐ international search (Rule 12.3 and 23.1(b))
- ☐ publication of the international application (Rule 12.4)
- ☐ international preliminary examination (Rule 55.2 and/or 55.3)
2. With regard to the elements of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report)*:
- ☐ the international application as originally filed/furnished
- ☒ the description:
- pages 1-8, 11-13 as originally filed/furnished
- pages\* 9, 10 received by this Authority on 04.03.2005
- pages\* \_\_\_\_\_ received by this Authority on \_\_\_\_\_
- ☒ the claims:
- nos. 1-6, 8-10 as originally filed/furnished
- nos.\* \_\_\_\_\_ as amended (together with any statement) under Article 19
- nos.\* 7 received by this Authority on 04.03.2005
- nos.\* \_\_\_\_\_ received by this Authority on \_\_\_\_\_
- ☒ the drawings:
- sheets 1/1 as originally filed/furnished
- sheets\* \_\_\_\_\_ received by this Authority on \_\_\_\_\_
- sheets\* \_\_\_\_\_ received by this Authority on \_\_\_\_\_
- ☐ a sequence listing and/or any related table(s) – see Supplemental Box Relating to Sequence Listing.
3. ☐ The amendments have resulted in the cancellation of:
- ☐ the description, pages \_\_\_\_\_
- ☐ the claims, nos. \_\_\_\_\_
- ☐ the drawings, sheets/figs \_\_\_\_\_
- ☐ the sequence listing (*specify*): \_\_\_\_\_
- ☐ any table(s) related to sequence listing (*specify*): \_\_\_\_\_
4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).
- ☐ the description, pages \_\_\_\_\_
- ☐ the claims, nos. \_\_\_\_\_
- ☐ the drawings, sheets/figs \_\_\_\_\_
- ☐ the sequence listing (*specify*): \_\_\_\_\_
- ☐ any table(s) related to sequence listing (*specify*): \_\_\_\_\_

\* If item 4 applies, some or all of those sheets may be marked "superseded."

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Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement		
1. Statement			
Novelty (N)	Claims	<u>1-10</u>	YES
	Claims		NO
Inventive step (IS)	Claims	<u>7</u>	YES
	Claims	<u>1-6, 8-10</u>	NO
Industrial applicability (IA)	Claims	<u>1-10</u>	YES
	Claims		NO
2. Citations and explanations (Rule 70.7)			
Document 1: JP 2002-154882 A (NGK Insulators, Ltd.), 28 May 2002			
Document 2: JP 07-501485 A (Engelhard Corp.), 16 February 1995			
Document 3: JP 64-076986 A (NGK Insulators, Ltd.), 23 March 1989			
Document 4: JP 2000-218165 A (Ibiden Co., Ltd.), 8 August 2000			
Document 5: JP 02-180641 A (Ibiden Co., Ltd.), 13 July 1990			
<p>The invention set forth in claims 1-6 and 8-10 does not involve an inventive step in the light of documents 1-3 cited in the international search report.</p>			
<p>Claim 1</p>			
<p>Document 1 discloses a silicon carbide honeycomb structure having silicon oxide on the surface thereof and discloses in the embodiments an oxide content that fulfils the stipulation in claim 1 of the present application (see embodiments 6-15). Document 1 does not disclose a catalyst supported on said honeycomb structure. However, it would be easy for a person skilled</p>			

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in the art to conceive of applying the catalyst set forth in document 2, which was published prior to the present application, to the honeycomb structure disclosed in document 1. The effect of such an application would be that by providing the invention in document 1 with a silicon oxide film, the anti-oxidation and the heat-resistance is increased and would be within the expected range for such effects. The description of the present application indicates that a honeycomb structure containing a catalyst such as alumina or ceria, wherein a silicon oxide film having a predetermined content of oxide is provided, offers an effect which is unexpected when compared to a honeycomb structure which does not contain a catalyst. However, since this point is not illustrated in the embodiments, it is not possible to accept the invention set forth in claim 1 is inventive in the light of documents 1 and 2.

## Claim 2

Document 3 discloses a structure for use at high temperatures with an improved anti-oxidation performance which is due to adding alumina to a silicon carbide structure and forming an oxidised film thereupon. However, it would be easy for a person skilled in the art to conceive of adding alumina to the honeycomb structure disclosed in document 1 on which an oxide layer has been formed on the silicon carbide surface in order to improve anti-oxidation performance. Claim 2 does not specify the porosity of the honeycomb structure.

## Claim 3

When oxidising silicon carbide at a high

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temperature, the silicon oxide produced is mainly a cristobalite crystal. (See JP 58-130546 A).

Claim 4

The honeycomb structure disclosed in document 1 contains metal silicon.

Claims 5, 6 and 8-10

Document 1 discloses performing the thermal processing in the formation of the surface silicon oxide prior to the main baking and also after the main baking. The thermal processing temperature falls within the range of that stipulated in claims 8 and 10 and the document indicates that the thermal processing takes place at atmospheric pressure (in an atmosphere containing oxygen and water vapour).

The invention set forth in claims 1-6 and 8 does not involve an inventive step in the light of documents 2-4 or documents 2-3 and 5 cited in the international search report.

Documents 4 and 5 both disclose silicon carbide honeycomb structures wherein a silicon oxide film is provided on the surface thereof and the stipulation concerning the oxide content of the film duplicates the range set forth in the present claim 1. A honeycomb structure having as its main constituent silicon carbide and containing metal silicon was known prior to the priority date of the present application (see document 1, for example). The opinion regarding the other features is the same for those given with respect to document 1.

The invention set forth in claim 7 involves an

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inventive step in relation to documents 1-5 cited in the international search report.

None of these documents discloses a feature wherein the thermal processing of the honeycomb structure is performed using direct heat from a burner that uses natural gas as a fuel and this feature would not be obvious to a person skilled in the art.

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Box No. VII Certain defects in the international application

The following defects in the form or contents of the international application have been noted:

The wording "embodiments 7-8" in paragraph [0069] of the description after the amendments is believed to be an error and should be "embodiments 7-9".

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Box No. VIII Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

The wording of claim 7 after the amendments which states "heat generated by combustion performs the heating of the direct object" is unclear.